Environmental
Resources
Management

200 Harry S. Truman
Parkway, Suite 400
Annapolis, MD 21401
(410) 266-0006
(410) 266-8912 (fax)
http://www.erm.com

11 February 2014
Reference: 0229558

Ms. Barbara Smith
United States Environmental Protection Agency
RCRA Operations Branch, 3WC23
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

RE: Ground Water Monitoring at the Maryland Fire and Rescue Institute (MFRI), University of Maryland, College Park, Maryland
RCRA Corrective Action Permit MDD980829873

Dear Ms. Smith:

Environmental Resources Management, Inc. (ERM) has prepared this letter on behalf of the University of Maryland (UM) regarding the referenced project. UM is currently performing ground water monitoring at MFRI (Site) at four year intervals as required by the United States Environmental Protection Agency (EPA).

After reviewing ERM's report presenting the results of the 2012 ground water monitoring event at MFRI, EPA required, by its letter dated July 13, 2013, a ground water monitoring event in advance of the next scheduled event in 2016. On December 12, 2013, EPA approved UM's request to perform this sampling event in early 2014 in a telephone conversation with ERM. This report documents the results of the 2014 sampling event.

BACKGROUND

In 2007, UM performed a Corrective Measures Study (CMS) for MFRI and submitted the document titled *Corrective Measures Study Report for Ground Water Impacted by Petroleum Hydrocarbons at the Maryland Fire And Rescue Institute*. In response, EPA issued a pre-decision remedy schedule by letter dated January 2, 2008 to UM for future ground water monitoring events at the Site that included the continued monitoring of well PW-7 for methyl tertiary-butyl ether (MTBE) and naphthalene, and wells PW-17, PW-18, and PW-19 for benzene, ethylbenzene, toluene, xylenes (collectively referred to as BTEX), MTBE, and naphthalene every four years (2008, 2012, 2016, 2020, and 2024).

Four-year ground water monitoring was initiated at the Site by UM in 2008. The results of the 2008 sampling event have been provided to EPA under a prior submittal. Based on the results of the 2008 annual ground water monitoring event, the analyte list for PW-17 was reduced to benzene, MTBE, and naphthalene in accordance with EPA's January 2, 2008 letter stating that sampling for toluene, ethylbenzene, and xylenes is not required for PW-17 if these analytes were non-detect (ND) in January 2008.

The most recent four-year monitoring event occurred in 2012. Prior to sampling, the monitoring wells were redeveloped, at which time a thin layer of free product (oil) was detected in PW-17 and PW-18. UM notified EPA and the Maryland Department of the Environment (MDE) of this finding. MDE recommended that UM add a small amount of surfactant to the wells, followed by pumping. As recommended by MDE, a surfactant was added to these wells, and a vacuum extraction truck was used to remove the surfactant. Free product was not detected following these activities.

ERM submitted the 2012 ground water monitoring results to EPA in a letter report dated January 7, 2013. After reviewing ERM's report, EPA required, by its letter dated July 13, 2013, a ground water monitoring event in advance of the next scheduled event in 2016. This report presents the results of the 2014 monitoring event.

METHODS

Monitoring Well Redevelopment

Monitoring wells PW-7, PW-8, PW-16, PW-17, PW-18, and PW-19 were redeveloped on December 9, 2013 to ensure that a representative sample was collected from each well. ERM redeveloped the wells by removing approximately three to five well volumes from each well using a submersible pump. Prior to redevelopment, ERM measured the static water levels in each well, and gauged each well for possible free product using an optical interface probe (OIP).

Ground Water Sampling

Ground water samples were collected on January 9, 2014 from monitoring wells PW-7, PW-8, PW-16, PW-17, PW-18, and PW-19 at the Site in accordance with EPA's July 13, 2013 letter. Samples were collected following the procedures

outlined in the January 18, 2001 Work Plan that was approved by MDE. Prior to collecting the samples, a synoptic round of water levels was collected from all on-site wells (i.e., PW-7, PW-8, PW-15, PW-16, PW-17, PW-18, and PW-19). Each well was measured for the potential presence of free product using an OIP.

EPA's July 13, 2013 letter required the following analytical requirements for the monitoring event:

1. PW-7 – BTEX, MTBE, and naphthalene. Note that BTEX was included in this sampling event per EPA's July 13, 2013;
2. PW-17 – Benzene, MTBE, naphthalene, and total petroleum hydrocarbons (TPH) gasoline range (GRO), and TPH diesel range organics (DRO). Note that TPH GRO and TPH DRO were included in this sampling event per EPA's July 13, 2013;
3. PW-17, PW-18 and PW-19 – BTEX, MTBE, naphthalene, TPH GRO, and TPH DRO. Note that TPH GRO and TPH DRO were included in this sampling event per EPA's July 13, 2013; and
4. PW-8 and PW-16 – BTEX, naphthalene, and MTBE. PW-8 and PW-16 were included in this sampling event per EPA's July 13, 2013 letter.

RESULTS

Ground Water Flow

The water level measurements are presented in Table 1, and a ground water contour map for January 9, 2014 is presented as Figure 1. The ground water elevations indicate that flow during the 2014 sampling event was northerly. The ground water flow data show that the downgradient perimeter of the Site is well covered by the existing monitoring well network.

Ground Water Quality

Free product was not detected in any of the wells prior to sampling on January 9, 2014. The results of the water quality analyses are summarized in Table 2, and the laboratory reporting forms are included as Appendix A.

The Maximum Contaminant Levels (MCLs) or EPA's November 2013 Risk-Based Screening Levels (RSLs) for the volatile organic compounds (VOCs), which include benzene, ethylbenzene, MTBE, naphthalene, toluene, and xylenes, are also included in Table 2 as a frame of reference for reviewing the analytical

results. The standards in Table 2 for TPH DRO and TPH GRO are MDE's standards[1] for ground water. However, it is noted that these standards are drinking water standards that apply to constituent concentrations in a water supply system. Ground water at the Site and vicinity is not used as a source of potable water and will not be used in the future since UM has assigned to the deed an irrevocable and permanent easement to control ground water at the Site.

In general, the ground water monitoring results were lower than prior monitoring results. The results for each monitoring well are summarized below:

1. Property Boundary Monitoring Wells – Monitoring wells PW-7, PW-8 and PW-16 are located along the property boundary between MFRI and Paint Branch Creek. The samples from each of these wells were analyzed for BTEX, naphthalene, and MTBE. The results were ND with the exception of MTBE at 1.5 micrograms per liter (ug/L) at PW-7, which is well below its RSL of 20 ug/L;
2. Interior Monitoring Wells – PW-17 and PW-18 are located within the interior of MFRI. Ground water quality at these locations continues to show improving conditions. BTEX, MTBE, naphthalene, and TPH GRO concentrations were among the lowest measured since monitoring started in 2001. In fact, MTBE was not detected at PW-17 and PW-18, and the naphthalene concentrations were among the lowest detected since March 2001. TPH DRO concentrations at PW-17 and PW-18 were relatively low at 0.23 milligrams per liter (mg/L) and 4.4 mg/L, respectively. MDE's TPH DRO standard is 0.047 mg/L; and
3. At the former Above Ground Storage Tank and Oil/Water Separator – At PW-19, the concentrations detected in January 2014 were also among the lowest reported since March 2001, and indicate that ground water quality at this location continues to improve. MTBE and naphthalene were not detected. The only BTEX constituent detected was benzene at 37 ug/L. TPH GRO was reported at 500 mg/L, which is well below its maximum of 12,000 mg/L reported in 2002.

No VOCs were detected in either the equipment blank or the trip blank.

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[1] State of Maryland Department of the Environment Cleanup Standards for Soil and Ground Water, June 2008, Interim Final Guidance, Update No. 2.1.

CONCLUSIONS

The January 2014 data show that ground water quality continues to show improving conditions at MFRI. Prior investigations at the Site show that the ground water conditions pose negligible risk to human health or the environment.

FUTURE GROUND WATER MONITORING

ERM recommends that monitoring continue as required by EPA's letter dated January 2, 2008. Specifically, ground water monitoring should continue at the Site at a rate of once every four years, with the next sampling events scheduled for 2016 and 2020. PW-7 should continue to be monitored for MTBE and naphthalene; PW-17 should continue to be monitored for benzene, MTBE, and naphthalene; and PW-18 and PW-19 should continue to be monitored for BTEX, MTBE, and naphthalene. After the completion of monitoring in 2020, a verification sampling event will be scheduled for 2023

* * * *

Please call Scott Lupin at 301-405-3968 or me at 610-524-3614 if you have any questions or require clarification.

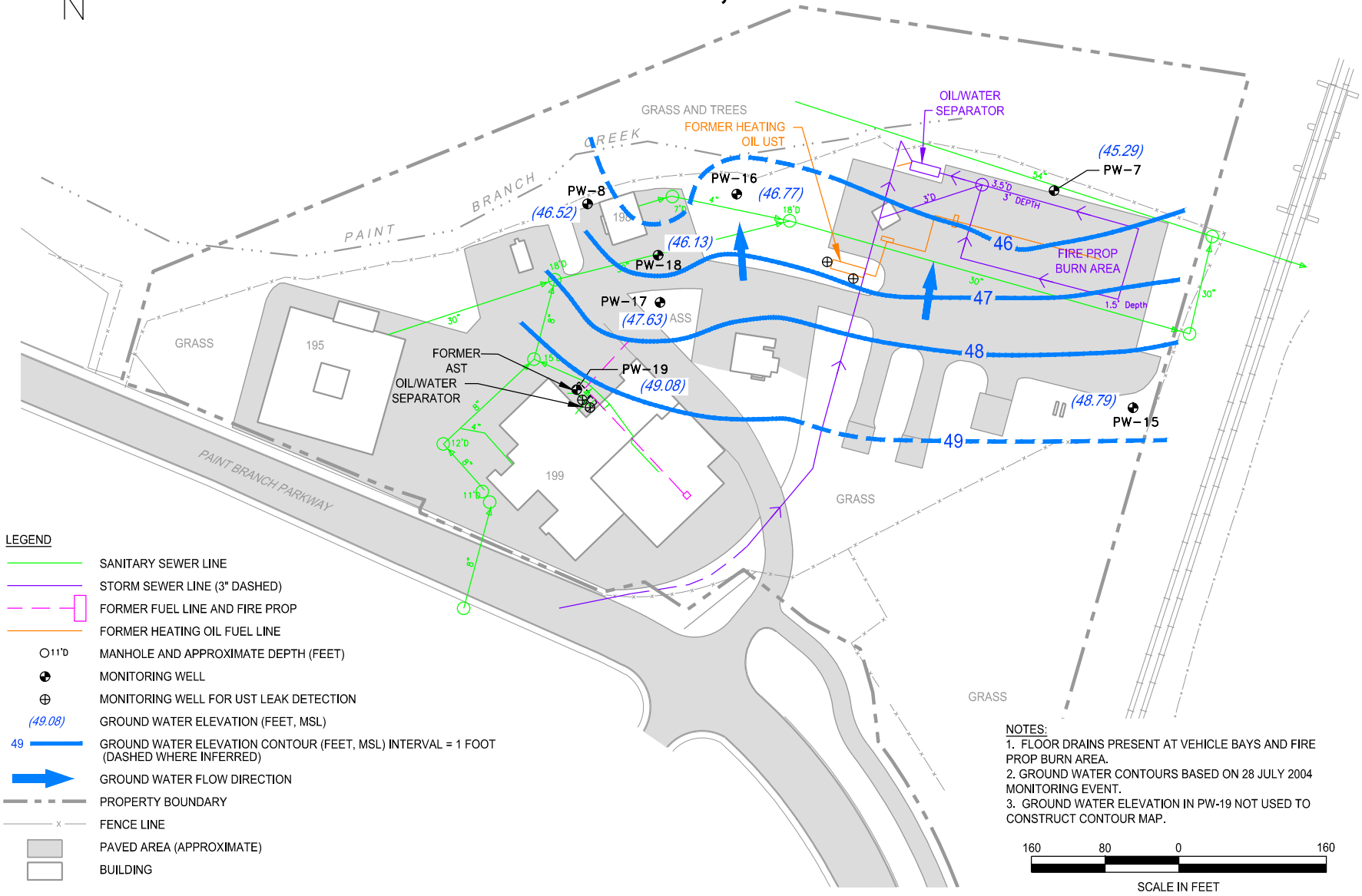
Sincerely,

Leonard G. Rafalko, PG
Project Manager

/lgr
enclosures
cc: S. Markowski – MDE
S. Lupin – UM
J. Follum – UM

Figure

FIGURE 1
SITE MAP
9 JANUARY 2014
MARYLAND FIRE AND RESCUE INSTITUTE
COLLEGE PARK, MARYLAND



SR – 2/6/14

ERM, INC.

Tables

Table 1
Well Details and Ground Water Elevations
Maryland Fire and Rescue Institute
College Park, Maryland

Well ID	Total Depth (ft)	Screen Length (ft)	Ground Surface Elev. (ft msl)	Reference Elev. (ft msl)	Ground Water Levels 29 March 2001				Ground Water Levels 26 April 2001				Ground Water Levels 9 July 2001				Ground Water Levels 12 July 2001				Ground Water Levels 29 October 2001			
					DTP (ft bre)	DTW (ft bre)	Product Thickness (ft)	Gr. Water Elevation (ft msl)	DTP (ft bre)	DTW (ft bre)	Product Thickness (ft)	Gr. Water Elevation (ft msl)	DTP (ft bre)	DTW (ft bre)	Product Thickness (ft)	Gr. Water Elevation (ft msl)	DTP (ft bre)	DTW (ft bre)	Product Thickness (ft)	Gr. Water Elevation (ft msl)	DTP (ft bre)	DTW (ft bre)	Product Thickness (ft)	Gr. Water Elevation (ft msl)
PW-7	16	10	56.79	56.48	NP [1]	10.55	0.00	45.93	NP [1]	10.85	0.00	45.63	NP	10.72	0.00	45.76	NM	NM	---	---	NP	11.89	0.00	44.59
PW-8	19	10	58.41	61.15	NP [1]	12.20	0.00	48.95	NP [1]	12.36	0.00	48.79	NP	12.77	0.00	48.38	NM	NM	---	---	NP	13.70	0.00	47.45
PW-15	25	20	57.14	56.73	NP [1]	8.14	0.00	48.59	NP [1]	8.24	0.00	48.49	NP	7.73	0.00	49.00	NM	NM	---	---	NP	10.11	0.00	46.62
PW-16	18	15	54.73	54.41	NP [1]	5.59	0.00	48.82	NP [1]	5.70	0.00	48.71	NP	6.02	0.00	48.39	NM	NM	---	---	NP	6.98	0.00	47.43
PW-17	25	20	60.70	60.18	NP [1]	12.09	0.00	48.09	NP [1]	11.84	0.00	48.34	NP	11.70	0.00	48.48	NP	NM	0.00	---	NP	13.33	0.00	46.85
PW-18	24.8	20	59.54	59.03	NP [1]	11.30	0.00	47.73	NP [1]	11.33	0.00	47.70	NP	11.34	0.00	47.69	NP	NM	0.00	---	NP	12.78	0.00	46.25
PW-19	24	20	58.87	58.38	Sheen	12.34	0.00	46.04	Sheen	12.67	0.00	45.71	NP	11.55	0.00	46.83	NP	NM	0.00	---	NP	13.56	0.00	44.82

Well ID	Total Depth (ft)	Screen Length (ft)	Ground Surface Elev. (ft msl)	Reference Elev. (ft msl)	Ground Water Levels 15 January 2002				Ground Water Levels 18 April 2002				Ground Water Levels 7-May-02				Ground Water Levels 28-Jan-03				Ground Water Levels 10-Jul-03				Ground Water Levels 28-Jan-04			
					DTP (ft bre)	DTW (ft bre)	Product Thickness (ft)	Gr. Water Elevation (ft msl)	DTP (ft bre)	DTW (ft bre)	Product Thickness (ft)	Gr. Water Elevation (ft msl)	DTP (ft bre)	DTW (ft bre)	Product Thickness (ft)	Gr. Water Elevation (ft msl)	DTP (ft bre)	DTW (ft bre)	Product Thickness (ft)	Gr. Water Elevation (ft msl)	DTP (ft bre)	DTW (ft bre)	Product Thickness (ft)	Gr. Water Elevation (ft msl)	DTP (ft bre)	DTW (ft bre)	Product Thickness (ft)	Gr. Water Elevation (ft msl)
PW-7	16	10	56.79	56.48	NP	11.28	0.00	45.20	NP	11.30	0.00	45.18	NM	NM	--	--	NP	10.67	0.00	45.81	NP	10.85	0.00	45.63	NP	11.23	0.00	45.25
PW-8	19	10	58.41	61.15	NP	13.94	0.00	47.21	NP	8.56	0.00	52.59	NM	NM	--	--	NP	14.29	0.00	46.86	NP	14.13	0.00	47.02	NP	14.24	0.00	46.91
PW-15	25	20	57.14	56.73	NP	9.05	0.00	47.68	NP	8.72	0.00	48.01	NM	NM	--	--	NM	NM	--	--	NP	7.22	0.00	49.51	NP	NM	0.00	--
PW-16	18	15	54.73	54.41	NP	7.01	0.00	47.40	NP	6.89	0.00	47.52	NM	NM	--	--	NP	7.87	0.00	46.54	NP	7.45	0.00	46.96	NP	NM	0.00	--
PW-17	25	20	60.70	60.18	NP	13.37	0.00	46.81	NP	12.90	0.00	47.28	NM	NM	--	--	NP	12.72	0.00	47.46	NP	11.83	0.00	48.35	NP	12.99	0.00	47.19
PW-18	24.8	20	59.54	59.03	NP	12.81	0.00	46.22	NP [2]	12.61	0.00	46.42	NP	12.53	0.00	46.50	NP	12.66	0.00	46.37	NP	11.97	0.00	47.06	NP	12.68	0.00	46.35
PW-19	24	20	58.87	58.38	NP	13.39	0.00	44.99	NP [2]	12.89	0.00	45.49	NP	12.75	0.00	45.63	NP	10.75	0.00	47.63	NP	8.81	0.00	49.57	NP	10.33	0.00	48.05
B00-7 [3]	16	10	59.07	58.95	NP	11.28	0.00	47.67	NP [2]	10.75	0.00	48.20	NP	10.68	0.00	48.27	ABAN	ABAN	--	--	ABAN	ABAN	--	--	ABAN	ABAN	--	--

Well ID	Total Depth (ft)	Screen Length (ft)	Ground Surface Elev. (ft msl)	Reference Elev. (ft msl)	Ground Water Levels 28-Jul-04				Ground Water Levels 24-Jan-05				Ground Water Levels 19-Jul-05				Ground Water Levels 17-Jan-06				Ground Water Levels 12-Jul-06				Ground Water Levels 16-Jan-07			
					DTP (ft bre)	DTW (ft bre)	Product Thickness (ft)	Gr. Water Elevation (ft msl)	DTP (ft bre)	DTW (ft bre)	Product Thickness (ft)	Gr. Water Elevation (ft msl)	DTP (ft bre)	DTW (ft bre)	Product Thickness (ft)	Gr. Water Elevation (ft msl)	DTP (ft bre)	DTW (ft bre)	Product Thickness (ft)	GWE (ft msl)	DTP (ft bre)	DTW (ft bre)	Product Thickness (ft)	GWE (ft msl)	DTP (ft bre)	DTW (ft bre)	Product Thickness (ft)	GWE (ft msl)
PW-7	16	10	56.79	56.48	NP	9.13	0.00	47.35	NP	11.12	0.00	45.36	NP	11.10	0.00	45.36	NP	11.22	0.00	45.26	NP	10.02	0.00	46.46	NP	10.45	0.00	46.03
PW-8	19	10	58.41	61.15	NP	12.11	0.00	49.04	NP	14.42	0.00	46.73	NM	NM	--	--	NP	14.62	0.00	46.53	NM	NM	--	--	NP	14.55	0.00	46.60
PW-15	25	20	57.14	56.73	NP	6.51	0.00	50.22	NP	8.31	0.00	48.42	NP	8.09	0.00	48.42	NP	7.75	0.00	48.98	NP	8.26	0.00	48.47	NP	8.14	0.00	48.59
PW-16	18	15	54.73	54.41	NP	4.49	0.00	49.92	NP	7.84	0.00	46.57	NP	7.80	0.00	46.57	NP	7.87	0.00	46.54	NP	7.57	0.00	46.84	NP	7.80	0.00	46.61
PW-17	25	20	60.70	60.18	NP	9.90	0.00	50.28	NP	12.66	0.00	47.52	NP	12.65	0.00	47.52	NP	12.84	0.00	47.34	NP	11.84	0.00	48.34	NP	12.54	0.00	47.64
PW-18	24.8	20	59.54	59.03	NP	10.24	0.00	48.79	NP	12.32	0.00	46.71	NP	11.67	0.00	46.71	NP	12.51	0.00	46.52	NP	12.24	0.00	46.79	NP	12.38	0.00	46.65
PW-19	24	20	58.87	58.38	NP	8.57	0.00	49.81	NP	9.82	0.00	48.56	NP	9.85	0.00	48.56	NP	10.00	0.00	48.38	NP	8.93	0.00	49.45	NP	9.25	0.00	49.13

Well ID	Total Depth (ft)	Screen Length (ft)	Ground Surface Elev. (ft msl)	Reference Elev. (ft msl)	Ground Water Levels 9-Jan-08				Ground Water Levels 12-Sep-12				Ground Water Levels 22-Oct-12				Ground Water Levels 4-Dec-12				Ground Water Levels 9-Jan-14			
					DTP (ft bre)	DTW (ft bre)	Product Thickness (ft)	Gr. Water Elevation (ft msl)	DTP (ft bre)	DTW (ft bre)	Product Thickness (ft)	Gr. Water Elevation (ft msl)	DTP (ft bre)	DTW (ft bre)	Product Thickness (ft)	Gr. Water Elevation (ft msl)	DTP (ft bre)	DTW (ft bre)	Product Thickness (ft)	Gr. Water Elevation (ft msl)	DTP (ft bre)	DTW (ft bre)	Product Thickness (ft)	Gr. Water Elevation (ft msl)
PW-7	16	10	56.79	56.48	NP	11.36	0.00	45.12	NP	11.42	0.00	45.06	12.14	12.16	0.02	44.32	NP	11.48	0.00	45.00	NP	11.19	0.00	45.29
PW-8	19	10	58.41	61.15	NP	14.80	0.00	46.35	NP	15.04	0.00	46.11	NP	15.13	0.00	46.02	NP	14.93	0.00	46.22	NP	14.63	0.00	46.52
PW-15	25	20	57.14	56.73	NP	8.73	0.00	48.00	NP	10.22	0.00	46.51	NP	10.75	0.00	45.98	NP	10.64	0.00	46.09	NP	7.94	0.00	48.79
PW-16	18	15	54.73	54.41	NP	7.90	0.00	46.51	NP	8.14	0.00	46.27	NP	8.23	0.00	46.18	NP	8.16	0.00	46.25	NP	7.64	0.00	46.77
PW-17	25	20	60.70	60.18	NP	12.98	0.00	47.20	NP	13.63	0.00	46.55	NP	14.10	0.00	46.08	NP	13.75	0.00	46.43	NP	12.55	0.00	47.63
PW-18	24.8	20	59.54	59.03	NP	12.81	0.00	46.22	13.64	13.66	0.02	45.37	13.83	13.86	0.03	45.17	NP	13.38	0.00	45.65	NP	12.90	0.00	46.13
PW-19	24	20	58.87	58.38	NP	10.15	0.00	48.23	NP	11.37	0.00	47.01	NP	13.24	0.00	45.14	NP	12.67	0.00	45.71	NP	9.30	0.00	49.08

Notes: All wells are four-inch diameter.
ABAN - abandoned.
DTP - depth to product.
DTW - depth to water.
ft bre - feet below reference elevation; reference elevations are top of PVC riser pipe.
ft msl - feet above mean sea level, USGS datum.

NP - no measureable product.
NM - not measured.
-- - measurement not available; DTW or DTP was not measured or well was abandoned.
[1] No free product or sheen visible on water level indicator probe.
[2] Lack of product present in well confirmed on 7 May 2002.
[3] B00-7 was abandoned 13 September 2002.

Table 2
Summary of Ground Water Sample Analytical Results, January 2014
Maryland Fire and Rescue Institute
College Park, Maryland

		PW-7																	PW-8							
Analyte	**MCL [1]**	**Mar-01**	**Jul-01**	**Oct-01**	**Jan-02**	**Apr-02**	**Jan-03**	**Jul-03**	**Jan-04**	**Jul-04**	**Jan-05**	**Jul-05**	**Jan-06**	**Jul-06**	**Jan-07**	**Jan-08**	**Dec-12**	**Jan-14**	**Mar-00**	**Mar-01**	**Jul-01**	**Oct-01**	**Jan-02**	**Apr-02**	**Jan-03**	**Jan-14**
TPH - DRO (mg/L)	0.047 [2]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	NA	NA
TPH - GRO (ug/L)	0.047 [2]	< 100	< 100	< 100	< 500	< 100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 100	< 100	< 100	< 100	< 100	NA	NA
Benzene (ug/L)	5	< 1	< 10	< 5	< 10	< 5	< 1	< 1	1	1	NA	NA	NA	NA	NA	NA	NA	<1	< 0.005	< 1	< 5	< 5	< 5	< 5	< 1	< 1
Ethyl Benzene (ug/L)	700	1	< 10	< 5	< 10	< 5	< 1	< 1	< 1	14	NA	NA	NA	NA	NA	NA	NA	<1	< 0.005	< 1	< 5	< 5	< 5	< 5	< 1	< 1
Toluene (ug/L)	1,000	< 1	< 10	< 5	< 10	< 5	< 1	< 1	< 1	< 1	NA	NA	NA	NA	NA	NA	NA	<1	< 0.005	< 1	< 5	< 5	< 5	< 5	< 1	< 1
Xylenes (total) (ug/L)	10,000	< 1	< 10	< 5	< 30	< 15	< 1	< 1	< 1	14	NA	NA	NA	NA	NA	NA	NA	<1	< 0.005	< 1	< 5	< 5	< 15	< 15	< 1	< 1
Total BTEX		**1**	0	0	0	0	0	0	**1**	**29**	NA	NA	NA	NA	NA	NA	NA	0	0	0	0	0	0	0	0	0
MTBE (ug/L)	20 [2]	10	29	36	78	27	4	< 1	2	13	5	7	7	10	4	10	3.7	1.5	NA	< 1	< 5	< 5	< 5	< 5	< 1	< 1
Naphthalene (ug/L)	0.65 [2]	< 1	< 10	< 5	< 10	< 5	< 1	< 1	< 1	160	180	110	84	32	25	26	240	<1	< 0.005	< 1	< 5	< 5	< 5	< 5	< 1	< 1

		PW-15					PW-16							PW-17														
Analyte	**MCL [1]**	**Mar-01**	**Jul-01**	**Oct-01**	**Jan-02**	**Apr-02**	**Mar-01**	**Jul-01**	**Oct-01**	**Jan-02**	**Apr-02**	**Jan-03**	**Jan-14**	**Mar-01**	**Jul-01**	**Oct-01**	**Jan-02**	**Apr-02**	**Jan-03**	**Jul-03**	**Jan-04**	**Jul-04**	**Jan-05**	**Jul-05**	**Jan-06**	**Jul-06**	**Jan-07**	**Jan-08**	**Dec-12**	**Jan-14**
TPH - DRO (mg/L)	0.047 [2]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	NA	NA	1.1 [3]	0.5 [3]	1.0 [3]	0.6 [3]	< 0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.23 LF
TPH - GRO (ug/L)	0.047 [2]	< 200	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 500	< 100	NA	NA	6,200	5,300	7,100	5,100	1,500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,200
Benzene (ug/L)	5	< 2	< 5	< 5	< 5	< 5	< 1	< 5	< 5	< 5	< 5	< 1	< 1	1,200	1,800	1,700	1,600	290	1,700	4	1,700	2	170	12	320	46	21	2	17	28
Ethyl Benzene (ug/L)	700	< 2	< 5	< 5	< 5	< 5	< 1	< 5	< 5	< 5	< 5	< 1	< 1	26	46	< 25	11	< 25	52	< 1	20	< 1	3	<1	4	<1	<1	<1	NA	NA
Toluene (ug/L)	1,000	< 2	< 5	< 5	< 5	< 5	< 1	< 5	< 5	< 5	< 5	< 1	< 1	20	21	< 25	21	< 25	35	< 1	21 B	< 1	2	<1	4	<1	<1	<1	NA	NA
Xylenes (total) (ug/L)	10,000	< 2	< 5	< 5	< 15	< 15	< 1	< 5	< 5	< 15	< 15	< 1	< 1	13	< 25	< 25	< 75	< 75	11	< 1	19	< 1	4	<1	5	<1	<1	<1	<3	NA	NA
Total BTEX		0	0	0	0	0	0	0	0	0	0	0	0	**1,259**	**1,867**	**1,700**	**1,632**	**290**	**1,798**	**4**	**1,739**	**2**	**179**	**12**	**333**	**46**	**21**	**2**	NA	NA
MTBE (ug/L)	20 [2]	< 2	< 5	< 5	< 5	< 5	< 1	< 5	< 5	< 5	< 5	< 1	< 1	56	14	< 25	13	< 25	13	< 1	49	< 1	18	<1	22	4	2	6	8.3	<1
Naphthalene (ug/L)	0.65 [2]	< 2	< 5	< 5	< 5	< 5	2	< 5	< 5	< 5	< 5	< 1	< 1	11	< 25	< 25	< 25	< 25	6	< 1	29	< 1	4	<1	7	1	<1	2	87	0.54 J

		PW-18																	PW-19										
Analyte	**MCL [1]**	**Mar-01**	**Jul-01**	**Oct-01**	**Jan-02**	**Apr-02**	**Jan-03**	**Jul-03**	**Jan-04**	**Jul-04**	**Jan-05**	**Jul-05**	**Jan-06**	**Jul-06**	**Jan-07**	**Jan-08**	**Dec-12**	**Jan-14**	**Jan-03**	**Jul-03**	**Jan-04**	**Jul-04**	**Jan-05**	**Jul-05**	**Jan-06**	**Jul-06**	**Jan-07**	**Jan-08**	**Dec-12**	**Jan-14**
TPH - DRO (mg/L)	0.047 [2]	2.9	2.4 [3]	2.4 [3]	1.5 [3]	1.4 [3]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.4 LF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.1
TPH - GRO (ug/L)	0.047 [2]	8,900	8,600	11,000	12,000	8,100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	500
Benzene (ug/L)	5	1,600	1,400	1,400	2,000	1,300	940	780	890	600	1,000	910	930	830	87	210	350	200	550	1000	350	420	460	680	460	250	310	290	380	37
Ethyl Benzene (ug/L)	700	500	260	510	350	220	85	100	28	79	140	140	34	33	4	100	95	20	65	74	12	19	13	13	9	3	8	9	25	<1
Toluene (ug/L)	1,000	30	16	< 25	21	< 5	14	9	11 B	7	10	<10	12	7	<1	5	<10	6.2	43	< 5	4 B	2	1	<10	<1	<1	1	3	<10	<1
Xylenes (total) (ug/L)	10,000	260	240	280	130	65	18	15	19	18	32	20	15	11	<3	10	24	5.4	130	61	22	16	14	11	12	4	13	20	<10	<1
Total BTEX		**2,390**	**1,916**	**2,190**	**2,501**	**1,585**	**1,057**	**904**	**937**	**704**	**1,182**	**1,070**	**991**	**881**	**91**	**325**	**469**	**231.6**	**788**	**1,135**	**384**	**457**	**488**	**704**	**481**	**257**	**332**	**322**	**405**	**37**
MTBE (ug/L)	20 [2]	78	10	< 25	18	< 25	54	< 5	59	48	53	50	54	36	2	34	41	<1	<1	< 1	19	37	20	25	22	9	9	27	50	<1
Naphthalene (ug/L)	0.65 [2]	26	100	280	160	75	25	62	54	71	160	110	87	67	8	200	3,300	37	28	56	38	44	25	30	24	14	12	60	660	<1

		B-007 [4]					
Analyte	**MCL [1]**	**Mar-00**	**Mar-01**	**Jul-01**	**Oct-01**	**Jan-02**	**Apr-02**
TPH - DRO (mg/L)	0.047 [2]	112	1.6 [3]	1.3 [3]	22 [3]	22 [3]	20 [3]
TPH - GRO (ug/L)	0.047 [2]	52,640	6,300	10,000	13,000	8,000	8,000
Benzene (ug/L)	5	2,130	1,300	3,300	1,500	1,500	2,000
Ethyl Benzene (ug/L)	700	1,002	86	150	520	88	170
Toluene (ug/L)	1,000	910	34	48	< 100	< 250	< 100
Xylenes (total) (ug/L)	10,000	2,900	36	140	270	< 750	< 300
Total BTEX		**6,942**	**1,456**	**3,638**	**2,290**	**1,588**	**2,170**
MTBE (ug/L)	20 [2]	3,270	120	91	< 100	130 E	180
Naphthalene (ug/L)	0.65 [2]	386	< 20	41	270	< 250	< 100

Notes:

< 1 - not detected at the quantitation level of 1.
mg/L - milligrams per liter.
ug/L - micrograms per liter.
NA - not analyzed for specifed parameter.
NA - no standard available.
LF - Lighter fuel/oil pattern observed in sample.
E - estimated value, less than quantitation limit.
[1] MCL - EPA Maximum Contaminant Level. EPA National Primary Drinking Water Regulations, EPA 816-F-09-004, May 2009. For reference only; ground water not used at site or in area.
[2] MDE Groundwater Cleanup Standard for Type I and II Aquifers. MDE Cleanup Standards for Soil and Groundwater, Interim Final Guidance, Update No. 2.1, June 2008. For reference only; ground water not used at site or in area.
[3] Gasoline pattern observed in sample.
[4] B-007 was abandoned 13 September 2002.
J - Target analyte was postively identified below the Reporting Limit but greater than the Limit of Detection.

Appendix

Appendix A
Laboratory Report Forms

Analytical Report for

ERM, Inc. - Annapolis

Certificate of Analysis No.: 14011013

Project Manager: Dusty Aeiker
Project Name : MFRI GW Samp
Project Location: College Park, MD
Project ID : 229558

January 17, 2014

Phase Separation Science, Inc.
6630 Baltimore National Pike
Baltimore, MD 21228
Phone: (410) 747-8770
Fax: (410) 788-8723

SAMPLE CHAIN OF CUSTODY/AGREEMENT FORM

PHASE SEPARATION SCIENCE, INC.

www.phaseonline.com
email: info@phaseonline.com

(1) *CLIENT: ERM *OFFICE LOC.: Annapolis
*PROJECT MGR: D. Aeiken *PHONE NO.: (410) 266 0006
EMAIL: Dusty.Aeiken@erm FAX NO.: ( ) 8912
*PROJECT NAME: MFRI GW Samp PROJECT NO.: 229558
SITE LOCATION: College Park, MD P.O. NO.:
SAMPLER(S): T. Poremski DW CERT NO.:

PSS Work Order #: 14011013 PAGE 1 OF 1

Matrix Codes: SW=Surface Wtr DW=Drinking Wtr GW=Ground Wtr WW=Waste Wtr O=Oil S=Soil L=Liquid SOL=Solid A=Air WI=Wipe

(2)

LAB NO.	*SAMPLE IDENTIFICATION	*DATE (SAMPLED)	*TIME (SAMPLED)	MATRIX (See Codes)	No. CONTAINERS	SAMPLE TYPE C=COMP G=GRAB	Preservatives Used												REMARKS
							Analysis/ Method Required (3) *	MTBE	Naphthalene	BTEX	TPH GRO	TPH DRO	Benzene						
								NaCl	HCl	HCl	HCl	—	HCl						
1	TB-1 (010914)	1/9/14	0925	GW	2	G		X	X	X									VOCs-8260B
2	EB-1 (010914)		1328		3			X	X	X									
3	PW-7		1241		3			X	X	X									
4	PW-8		0951		3			X	X	X									
5	PW-16		1051		3			X	X	X									
6	PW-17		1141		7			X	X		X	X	X						
7	PW-18		1336		7			X	X	X	X	X							
8	PW-19		1437		7			X	X	X	X	X							

(5)

Relinquished By: (1)	Date	Time	Received By:
Tracy Poremski	1/10/14	~~0800~~ 1412	Dan Carter #1035
Relinquished By: (2)	Date	Time	Received By:
Dan Carter #1035	01/10/14	14:20	
Relinquished By: (3)	Date	Time	Received By:
Relinquished By: (4)	Date	Time	Received By:

(4)

*Requested TAT (One TAT per COC)
☒ 5-Day ☐ 3-Day ☐ 2-Day ☐ Next Day ☐ Emergency ☐ Other

Data Deliverables Required:
COA ☐ QC SUMM ☐ CLP LIKE ☐ OTHER ____

# of Coolers: 1
Custody Seal: Intact Cooler
Ice Present: Yes Temp: 2°C
Shipping Carrier: FedEx

Special Instructions:
See Contract for RL, DL, Methods, etc.

DW COMPLIANCE? YES ☐
EDD FORMAT TYPE: ____
STATE RESULTS REPORTED TO: MD ☒ DE ☐ PA ☐ VA ☐ WV ☐ OTHER ____

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800-932-9047
FAX 410-788-8723

PHASE SEPARATION SCIENCE, INC.

CERTIFICATE OF ANALYSIS

No: 14011013

ERM, Inc. - Annapolis, Annapolis, MD

January 17, 2014

Project Name: MFRI GW Samp
Project Location: College Park, MD
Project ID: 229558

Sample ID: TB-1 (010914) **Date/Time Sampled: 01/09/2014 09:25** **PSS Sample ID: 14011013-001**
Matrix: WATER **Date/Time Received: 01/10/2014 14:20**

GC/MS Purgeable Aromatics — Analytical Method: SW-846 8260 B — Preparation Method: 5030B

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Methyl-t-butyl ether	ND	ug/L	1.0		1	0.5	01/14/14	01/14/14 16:04	1011
Benzene	ND	ug/L	1.0		1	0.5	01/14/14	01/14/14 16:04	1011
Toluene	ND	ug/L	1.0		1	0.5	01/14/14	01/14/14 16:04	1011
Ethylbenzene	ND	ug/L	1.0		1	0.5	01/14/14	01/14/14 16:04	1011
m,p-Xylenes	ND	ug/L	2.0		1	1	01/14/14	01/14/14 16:04	1011
o-Xylene	ND	ug/L	1.0		1	0.5	01/14/14	01/14/14 16:04	1011
Naphthalene	ND	ug/L	1.0		1	0.5	01/14/14	01/14/14 16:04	1011

Sample ID: EB-1 (010914) **Date/Time Sampled: 01/09/2014 13:28** **PSS Sample ID: 14011013-002**
Matrix: WATER **Date/Time Received: 01/10/2014 14:20**

GC/MS Purgeable Aromatics — Analytical Method: SW-846 8260 B — Preparation Method: 5030B

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Methyl-t-butyl ether	ND	ug/L	1.0		1	0.5	01/14/14	01/14/14 16:34	1011
Benzene	ND	ug/L	1.0		1	0.5	01/14/14	01/14/14 16:34	1011
Toluene	ND	ug/L	1.0		1	0.5	01/14/14	01/14/14 16:34	1011
Ethylbenzene	ND	ug/L	1.0		1	0.5	01/14/14	01/14/14 16:34	1011
m,p-Xylenes	ND	ug/L	2.0		1	1	01/14/14	01/14/14 16:34	1011
o-Xylene	ND	ug/L	1.0		1	0.5	01/14/14	01/14/14 16:34	1011
Naphthalene	ND	ug/L	1.0		1	0.5	01/14/14	01/14/14 16:34	1011

Sample ID: PW-7 **Date/Time Sampled: 01/09/2014 12:41** **PSS Sample ID: 14011013-003**
Matrix: GROUND WATER **Date/Time Received: 01/10/2014 14:20**

GC/MS Purgeable Aromatics — Analytical Method: SW-846 8260 B — Preparation Method: 5030B

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Methyl-t-butyl ether	**1.5**	ug/L	1.0		1	0.5	01/15/14	01/16/14 05:44	1011
Benzene	ND	ug/L	1.0		1	0.5	01/15/14	01/16/14 05:44	1011
Toluene	ND	ug/L	1.0		1	0.5	01/15/14	01/16/14 05:44	1011
Ethylbenzene	ND	ug/L	1.0		1	0.5	01/15/14	01/16/14 05:44	1011
m,p-Xylenes	ND	ug/L	2.0		1	1	01/15/14	01/16/14 05:44	1011
o-Xylene	ND	ug/L	1.0		1	0.5	01/15/14	01/16/14 05:44	1011
Naphthalene	ND	ug/L	1.0		1	0.5	01/15/14	01/16/14 05:44	1011

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PHASE SEPARATION SCIENCE, INC.

CERTIFICATE OF ANALYSIS

No: 14011013

ERM, Inc. - Annapolis, Annapolis, MD

January 17, 2014

Project Name: MFRI GW Samp
Project Location: College Park, MD
Project ID: 229558

Sample ID: PW-8 **Date/Time Sampled: 01/09/2014 09:51** **PSS Sample ID: 14011013-004**
Matrix: GROUND WATER **Date/Time Received: 01/10/2014 14:20**

GC/MS Purgeable Aromatics — Analytical Method: SW-846 8260 B — Preparation Method: 5030B

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Methyl-t-butyl ether	ND	ug/L	1.0		1	0.5	01/14/14	01/14/14 18:03	1011
Benzene	ND	ug/L	1.0		1	0.5	01/14/14	01/14/14 18:03	1011
Toluene	ND	ug/L	1.0		1	0.5	01/14/14	01/14/14 18:03	1011
Ethylbenzene	ND	ug/L	1.0		1	0.5	01/14/14	01/14/14 18:03	1011
m,p-Xylenes	ND	ug/L	2.0		1	1	01/14/14	01/14/14 18:03	1011
o-Xylene	ND	ug/L	1.0		1	0.5	01/14/14	01/14/14 18:03	1011
Naphthalene	ND	ug/L	1.0		1	0.5	01/14/14	01/14/14 18:03	1011

Sample ID: PW-16 **Date/Time Sampled: 01/09/2014 10:51** **PSS Sample ID: 14011013-005**
Matrix: GROUND WATER **Date/Time Received: 01/10/2014 14:20**

GC/MS Purgeable Aromatics — Analytical Method: SW-846 8260 B — Preparation Method: 5030B

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Methyl-t-butyl ether	ND	ug/L	1.0		1	0.5	01/14/14	01/15/14 05:51	1011
Benzene	ND	ug/L	1.0		1	0.5	01/14/14	01/15/14 05:51	1011
Toluene	ND	ug/L	1.0		1	0.5	01/14/14	01/15/14 05:51	1011
Ethylbenzene	ND	ug/L	1.0		1	0.5	01/14/14	01/15/14 05:51	1011
m,p-Xylenes	ND	ug/L	2.0		1	1	01/14/14	01/15/14 05:51	1011
o-Xylene	ND	ug/L	1.0		1	0.5	01/14/14	01/15/14 05:51	1011
Naphthalene	ND	ug/L	1.0		1	0.5	01/14/14	01/15/14 05:51	1011

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CERTIFICATE OF ANALYSIS

No: 14011013

ERM, Inc. - Annapolis, Annapolis, MD

January 17, 2014

Project Name: MFRI GW Samp
Project Location: College Park, MD
Project ID: 229558

Sample ID: PW-17 **Date/Time Sampled: 01/09/2014 11:41** **PSS Sample ID: 14011013-006**
Matrix: GROUND WATER **Date/Time Received: 01/10/2014 14:20**

Total Petroleum Hydrocarbons - DRO — Analytical Method: SW-846 8015 C — Preparation Method: 3510C

LF - Lighter fuel/oil pattern observed in sample.

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
TPH-DRO (Diesel Range Organics)	**0.23**	mg/L	0.047	LF	1	0.04	01/13/14	01/13/14 19:11	1040

Total Petroleum Hydrocarbons-GRO — Analytical Method: SW-846 8015C — Preparation Method: 5030B

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
TPH-GRO (Gasoline Range Organics)	**1,200**	ug/L	47		1	40	01/13/14	01/13/14 12:00	1035

GC/MS Purgeable Aromatics (BMN only) — Analytical Method: SW-846 8260 B — Preparation Method: 5030B

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Methyl-t-Butyl Ether	ND	ug/L	1.0		1	0.5	01/14/14	01/15/14 06:20	1011
Benzene	**28**	ug/L	1.0		1	0.5	01/14/14	01/15/14 06:20	1011
Naphthalene	**0.54**	ug/L	1.0	J	1	0.5	01/14/14	01/15/14 06:20	1011

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No: 14011013

ERM, Inc. - Annapolis, Annapolis, MD

January 17, 2014

Project Name: MFRI GW Samp
Project Location: College Park, MD
Project ID: 229558

Sample ID: PW-18 **Date/Time Sampled: 01/09/2014 13:36** **PSS Sample ID: 14011013-007**
Matrix: GROUND WATER **Date/Time Received: 01/10/2014 14:20**

Total Petroleum Hydrocarbons - DRO — Analytical Method: SW-846 8015 C — Preparation Method: 3510C

LF/HF - Lighter and heavier fuel/oil patterns observed in sample.

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
TPH-DRO (Diesel Range Organics)	**4.4**	mg/L	0.047	LF	1	0.04	01/13/14	01/13/14 19:34	1040

Total Petroleum Hydrocarbons-GRO — Analytical Method: SW-846 8015C — Preparation Method: 5030B

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
TPH-GRO (Gasoline Range Organics)	**5,000**	ug/L	47		1	40	01/13/14	01/13/14 12:26	1035

GC/MS Purgeable Aromatics — Analytical Method: SW-846 8260 B — Preparation Method: 5030B

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Methyl-t-butyl ether	ND	ug/L	1.0		1	0.5	01/14/14	01/15/14 06:49	1011
Benzene	**200**	ug/L	1.0		1	0.5	01/14/14	01/15/14 06:49	1011
Toluene	**6.2**	ug/L	1.0		1	0.5	01/14/14	01/15/14 06:49	1011
Ethylbenzene	**20**	ug/L	1.0		1	0.5	01/14/14	01/15/14 06:49	1011
m,p-Xylenes	**4.0**	ug/L	2.0		1	1	01/14/14	01/15/14 06:49	1011
o-Xylene	**1.4**	ug/L	1.0		1	0.5	01/14/14	01/15/14 06:49	1011
Naphthalene	**37**	ug/L	1.0		1	0.5	01/14/14	01/15/14 06:49	1011

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CERTIFICATE OF ANALYSIS

No: 14011013

ERM, Inc. - Annapolis, Annapolis, MD

January 17, 2014

Project Name: MFRI GW Samp
Project Location: College Park, MD
Project ID: 229558

Sample ID: PW-19 **Date/Time Sampled: 01/09/2014 14:37** **PSS Sample ID: 14011013-008**
Matrix: GROUND WATER **Date/Time Received: 01/10/2014 14:20**

Total Petroleum Hydrocarbons - DRO — Analytical Method: SW-846 8015 C — Preparation Method: 3510C

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
TPH-DRO (Diesel Range Organics)	**1.1**	mg/L	0.047		1	0.04	01/13/14	01/13/14 19:34	1040

Total Petroleum Hydrocarbons-GRO — Analytical Method: SW-846 8015C — Preparation Method: 5030B

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
TPH-GRO (Gasoline Range Organics)	**500**	ug/L	47		1	40	01/13/14	01/13/14 11:35	1035

GC/MS Purgeable Aromatics — Analytical Method: SW-846 8260 B — Preparation Method: 5030B

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Methyl-t-butyl ether	ND	ug/L	1.0		1	0.5	01/14/14	01/15/14 03:53	1011
Benzene	**37**	ug/L	1.0		1	0.5	01/14/14	01/15/14 03:53	1011
Toluene	ND	ug/L	1.0		1	0.5	01/14/14	01/15/14 03:53	1011
Ethylbenzene	ND	ug/L	1.0		1	0.5	01/14/14	01/15/14 03:53	1011
m,p-Xylenes	ND	ug/L	2.0		1	1	01/14/14	01/15/14 03:53	1011
o-Xylene	ND	ug/L	1.0		1	0.5	01/14/14	01/15/14 03:53	1011
Naphthalene	ND	ug/L	1.0		1	0.5	01/14/14	01/15/14 03:53	1011